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***IS MEDICAL SCHOOL A PERSONAL CHANGE
INCUBATOR? A SIX YEARS LONGITUDINAL
STUDY OF STUDENTS' PERSONALITY TRAITS***

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Is Medical School a Personal Change Incubator? A Six Years Longitudinal Study of Student's Personality Traits

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Abstract

Purpose

To determine if there were changes in personality's profile of medical students throughout their academic career in Medical School, and the direction of those changes if confirmed.

Method

In this longitudinal study, Revised NEO Personality Inventory was administered at 146 students from the Faculty of Medicine of the University of Coimbra at the beginning of college's first year. At the end of sixth year, 70 of the initial 146 students answered the questionnaire again. Personality facets' averages were compared using Student's t-test for paired samples.

Results

The medical students' population has changed its personality profile during its academic course in the Medical School. Neuroticism decreased significantly, while Agreeableness and Conscientiousness suffered only a marginally significant reduction. Students demonstrated a decrease in the personality's facets of Anxiety ($p < .01$), Depression ($p < .05$), Vulnerability ($p < .05$), Altruism ($p < .05$) and Modesty ($p < .05$), and an increase in Self-discipline facet ($p < .05$).

Discussion

Students' decrease in Anxiety, Depression and Vulnerability facets indicates they are more stable, confident, hopeful and resilient in the end of the academic course. Their increased Self-Discipline points to their ability in the future to continuously update the knowledge they

received in order to provide always the best for their patients. However, the decrease in personality's facets Altruism and Modesty is concerning - these findings suggest medical students may have developed an arrogant and overrated vision of themselves in relation to others, and also they became reluctant to get involved with others' problems.

Introduction

More than just a health professional, well versed in basic sciences of medicine and in different clinical disciplines, the patient seeks in the doctor the wise humanistic and eternal health advocate, able to communicate and collaborate with the multidisciplinary team that accompanies his case in order to effectively use all the tools involved in the therapeutic process.

According to these prerogatives, the curriculum of pre and post-graduate in Medicine is being modified all over the world, to incorporate requirements which should meet the needs of social health, such as medical expert, communicator, collaborator, manager, health advocate and scholar ¹.

In Portugal, the current method to select medical students is based in prior academic performance. In result, growing demands of work, concentration, isolation and competitive spirit have been increasing in teenagers opting for medicine as future profession. These demands could be seen as contrary to solidarity and openness desirable in future physicians. Throughout the course, the medical student should develop the ability to respond to "evolving societal needs, practice patterns, and scientific developments" ², and also to the "commitment to advocate at all times the interests of one's patients over one's own interests" ³.

During their academic career, the medical students are mainly trained in areas such as Biomedicine, Medical Legal and Deontological Sciences, Morphofunctional Sciences, Technological and Experimental Sciences of Health, Epidemiology, Surgery and Surgical Specialties, Public Health and Family Medicine, Gynecology, Maternal and Child Health, Medicine and Medical Specialties, Neurosciences and Mental Health ⁴.

A closer look at the disciplines and specifications of each of these fields of study will conclude the absence of specific training directed to acquire and optimize “skills related to leading, following, decision making, communicating, and allocating tasks as members of a team” ⁵.

Aron and Headrick identified the “premedical syndrome” in medical students at Harvard in 2002 – “premedical students become study machines and are characterized as hypercompetitive, narrow minded, greedy, and dishonest at best and “ferocious geeks” at worst” ⁶. They found several flaws in the medical curriculum, whose absence may justify the development of these characteristics, opposite to those intended, one of the flaws being the lack of an interdisciplinary training with all health professionals ⁶ – nurses, therapists, and social security agents, for instance. In 2009, Hojat et al ⁷ examined changes in medical student’s empathy during medical school and concluded that a significant decline in empathy occurs during the third year of medical school, this is, when the curriculum shifts towards patient-care activities. With a similar study at 2008, Newton et al ⁸ also concluded that vicarious empathy significantly decreased during medical education, especially after the first and third years. This is concerning, minding the fact that a good doctor-patient relation benefits the clinical outcomes ⁹, helps reduce patient’s complains ¹⁰, and increases patient’s satisfaction with the physician’s work ¹¹.

These evidences are experienced as of very high concern for all medical schools. It is legitimate to question ourselves whether the curricula of medical schools of our country meet

the requirements we believe to be necessary for a medical student's formation. Additionally, tomorrow's physician will result from the effect of the admission process in place and also from the current curricula and academic context influence. What is the medical profile resulting from this technical and impersonal combination? These were the questions that led to this study. It is important to know the personality of the students admitted to Medical School and follow their development along its route at University. Thus, this paper aims to answer the following key questions:

- Is there any change in personality's profile of medical students throughout their academic career in Medical School, based on the assumption this development will be influenced on one hand by curricular, social and emotional culture along the course, and on the other hand by initial personality's profile?

- If so, in which direction are emerging the personality profile changes of medical students? The presented study also aims to contribute to the improvement of the quality of physicians' training in Portugal, so this professional approaches the ideal of a XXI century's doctor.

Method

Participants

This study is the second moment of a longitudinal study that started in 2004 with students of the Faculty of Medicine of the University of Coimbra (FMUC). At the Moment 1 of the study, students were in 1st grade. The group consisted of 146 students, 73 Female and 70 Male (3 No response). The average age was 18 years old. At the Moment 2, these same students were in

the 6th grade (year 2010). The sample consisted of 70^δ individuals, 36 Female and 33 Male (1 No response). The average age was 24 years old.

Measures

In order to assess the students' personality profile, we used the Revised NEO Personality Inventory (NEO-PI-R) of Costa and McCrae ¹². It is an innovator instrument, which resulted from the deep research of generations of personality's psychologists. The scales were developed and refined through rational and theoretical methods of factor analysis, and had been the subject of intensive research with clinical samples and "normal" adults ¹³. It is endowed with validity, comprehensiveness, universality, heritability and longitudinal stability ¹².

This inventory operates the *Five Factor Model* – a model composed by five factors or domains of personality – Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness (C). Each domain is defined by 6 facets or traits, and each facet is accessed by 8 items. Together, the 5 domains' scales and the 30 facets' scales provide a comprehensive assessment of adult personality, in a total of 240 items.

We present below the facets of each domain of personality:

- Neuroticism (N): Anxiety, Hostility, Depression, Self-Consciousness, Impulsiveness, Vulnerability;
- Extroversion (E): Warmth, Gregariousness, Assertiveness, Activity, Excitement-Seeking, Positive Emotions;
- Openness (O): Fantasy, Aesthetics, Feelings, Actions, Ideas, Values;

^δ The 146 students of Moment 1 were approached at the end of required classes at Moment 2. It was explained the purpose of repeating the questionnaire, and asked to answer and hand it over the following days. 70 questionnaires were obtained, composing Moment 2 results. The 76 missing answers may be due to the misunderstanding of the study's purposes, to the forgetting to deliver the questionnaire or simply because students don't want to participate.

- Agreeableness (A): Trust, Straightforwardness, Altruism, Compliance, Modesty, Tender-Mindedness;

- Conscientiousness (C): Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, Deliberation.

Each of the 240 items is answered on a Likert scale of 5 points, in which the options range from “I strongly disagree” to “I strongly agree”. To calculate the total scores of each of the facets, we add the scores corresponding to the items of each facet.

The results obtained by the subjects in all the five factors allow us to obtain “a comprehensive scheme, which summarizes their emotional, interpersonal, experiential, attitudinal and motivational style”¹³.

NEO-PI-R “may be useful in understanding students of all ages, throughout their academic career”¹³.

We used the version of the inventory NEO-PI-R validated to the Portuguese population¹³.

This was validated for the population aged 17 or more years and can be applied individually or in groups. There was no time limit to respond - the majority of people took 30 to 40 minutes to answer.

Statistical analysis

We performed comparisons between Moment 1 (M1) and Moment 2 (M2), in order to analyze the statistically significant differences between the personality’s domains and facets in the 70 students who answered the inventory twice (in the two Moments). We used descriptive statistics – mean and standard deviation. We compared the averages of each domain and of each 30 personality facets using the Student’s t-test for paired samples. We used the Statistical Package for Social Sciences (SPSS, version 20.0) for statistical analysis.

Results

Descriptive statistics – mean and standard deviation – from Moment 1 and Moment 2 and *t*-test results of each domain's facets are presented in Tables 1 to 5.

Table 1 - Neuroticism facets' mean, standard deviation (SD) and *t*-test values of 70 medical students, 2004-2010 graduating class, FMUC

	Anxiety	Angry Hostility	Depression	Self-Consciousness	Impulsiveness	Vulnerability
M1 [‡] (SD)	19.88 (3.63)	13.76 (4.09)	16.15 (4.74)	18.23 (3.66)	17.23 (3.98)	13.64 (3.57)
M2 [§] (SD)	18.49 (4.08)	14.14 (4.15)	14.99 (4.97)	17.37 (3.50)	16.48 (3.94)	12.55 (4.20)
<i>t</i> (69)	2.99**	-.74	2.06*	1.55	1.39	2.27*

[‡] M1: Moment 1 mean (2004); [§] M2: Moment 2 mean (2010); **p*<.05; ***p*<.01

Table 2 - Extraversion facets' mean, standard deviation (SD) and *t*-test values of 70 medical students, 2004-2010 graduating class, FMUC

	Warmth	Gregariousness	Assertiveness	Activity	Excitement-Seeking	Positive Emotions
M1 [‡] (SD)	23.16 (3.64)	19.48 (4.91)	15.22 (3.84)	17.08 (3.64)	20.72 (4.05)	22.67 (4.57)
M2 [§] (SD)	22.81 (3.71)	18.69 (4.54)	14.74 (3.88)	17.29 (3.63)	20.49 (3.62)	22.98 (4.21)
<i>t</i> (69)	0.35	0.79	0.48	-0.21	0.23	-0.31

[‡] M1: Moment 1 mean (2004); [§] M2: Moment 2 mean (2010)

Table 3 - Openness facets' mean, standard deviation (SD) and t-test values of 70 medical students, 2004-2010 graduating class, FMUC

	Fantasy	Aesthetics	Feelings	Actions	Ideas	Values
M1 [‡] (SD)	20.35 (4.03)	20.35 (4.40)	22.38 (2.91)	16.50 (3.60)	20.28 (4.87)	20.04 (3.64)
M2 [§] (SD)	19.79 (3.97)	19.90 (4.69)	21.76 (3.10)	17.18 (4.14)	20.27 (4.57)	20.52 (3.31)
<i>t</i> (69)	0.55	0.46	0.62	-0.68	0.00	-0.48

[‡] M1: Moment 1 mean (2004); [§] M2: Moment 2 mean (2010)

Table 4 - Agreeableness facets' mean, standard deviation (SD) and t-test values of 70 medical students, 2004-2010 graduating class, FMUC

	Trust	Straightforwardness	Altruism	Compliance	Modesty	Tender-Mindedness
M1 [‡] (SD)	20.12 (4.37)	20.16 (3.39)	23.09 (3.55)	18.08 (3.51)	20.67 (3.34)	21.77 (3.01)
M2 [§] (SD)	20.27 (4.42)	20.32 (3.46)	22.30 (3.09)	17.33 (3.71)	19.72 (3.75)	21.14 (2.64)
<i>t</i> (69)	-0.15	-0.16	0.79*	0.75	0.95*	0.63

[‡] M1: Moment 1 mean (2004); [§] M2: Moment 2 mean (2010); *p<.05

Table 5 - Conscientiousness facets' mean, standard deviation (SD) and *t*-test values of 70 medical students, 2004-2010 graduating class, FMUC

	Competence	Order	Dutifulness	Achievement Striving	Self-Discipline	Deliberation
M1 [‡] (SD)	20.78 (3.29)	18.96 (5.40)	22.71 (3.03)	21.25 (3.40)	17.75 (4.39)	17.89 (4.31)
M2 [§] (SD)	21.45 (3.23)	19.40 (5.21)	23.33 (3.26)	20.99 (3.51)	19.04 (4.01)	18.72 (3.84)
<i>t</i> (69)	-0.67	-0.43	-0.62	0.25	-1.28*	-0.84

[‡] M1: Moment 1 mean (2004); [§] M2: Moment 2 mean (2010); * $p < .05$

Neuroticism experienced statistically significant changes between Moment 1 and Moment 2 (M1 mean = 98.89 (SD=16.43); M2 mean = 94.03 (SD=17.53); $t(69) = 2.35, p < .05$). A separate analysis of this domain's facets (Table 1) reveals a statistically significant decrease change in the facets of Anxiety, Depression and Vulnerability, between the two moments of the study.

There is no significant change between the two moments in the domains of Extraversion (M1 mean = 118.32 (SD=17.60); M2 mean = 116.00 (SD=17.44); $t(69) = .74, p > .05$) and Openness (M1 mean = 119.90 (SD=14.08); M2 mean = 119.42 (SD=16.48); $t(69) = .23, p > .05$). Separately, the analysis of the averages of these domains' facets (Tables 2 and 3) did not reveal any statistically significant change between Moment 1 and Moment 2.

In relation to the Agreeableness domain, change between Moment 1 and 2 is only marginally significant (M1 mean = 123.88 (SD=13.59); M2 mean = 121.07 (SD=13.91); $t(69) = 1.84, p < .10$). Despite this, the analysis of Table 4 shows significant change between Moment 1 and Moment 2 in Altruism and Modesty facets, since there is modification of these facets' averages towards its reduction.

Conscientiousness analysis performed by t-test values show that there is also a marginally significant change between the two moments of the study (M1 mean = 119.34 (SD=17.92); M2 mean = 122.93 (SD=16.44); $t(69) = -1.77, p < .10$). The analysis of Table 5 highlights Self-discipline as the only facet to undergo statistically significant change towards the increase of its average between the two moments.

Discussion

“Personality continues to be an important predictor of relationships”¹⁴. There has been great debate about the lifetime period in which personality stabilizes, and also about the possibility of continuous changing throughout development. According to Costa and McCrae “personality traits are essentially fixed and unchanging after age 30”¹⁵. Yet, meta-analytic findings show that personality continuity in adulthood peaks after age 50, and also that personality traits continue to change throughout adulthood, but only modestly after age 50¹⁴. “The majority of personality change occurs in young adulthood”¹⁴, contrarily to which traditional theories of psychological development argue - that major changes occur during adolescence. This happens because according to Arnett¹⁶ “young adulthood... involves more life-changing roles and identity decisions than any other period in the life course”. During these dramatic contextual changes, though, there is consistency in personality differences. Personality is a construction influenced by both formal and informal variables. In this study’s population, Medicine School acts as a formal variable, while pairs act as an informal one. During a lifetime, individuals express a “tendency to form unions with similar others”, which “has implications for the course of personality development because similarities between couple members create interpersonal experiences that reinforce initial tendencies”¹⁷. This

might help to better understand the course of the observed change in personality traits over time in this study's population.

The global analysis of this study results answer to its first major question. Is there any change in personality's profile of medical students throughout their academic career in Medical School? Our study demonstrates that several traits of personality have changed during undergraduate medical school. A more detailed analysis answers to its second question: in which direction did changes take place? Our students demonstrated a decrease in the personality's facets Anxiety, Depression, Vulnerability, Altruism and Modesty, and an increase in Self-discipline facet.

At the beginning of the present paper abilities and qualities that a medical doctor must have such as scientific knowledge, competence, wisdom, empathy and humanity were mentioned. The medical doctor should know how to hear the grievances of a patient, how to select the relevant information to the diagnostic process, interpret this information, formulate diagnostic hypotheses, know which methods to use to investigate and confirm those hypotheses, know how to diagnose and finally how to plan treatment. In order to do so, the physician must not only know how to act, but also trust his own knowledge to successfully use it in patient's behalf. The doctor has to know how to control its own emotions during this process – he must not only remain calm in order to transmit confidence to his patient, but also be resilient in order to not overshadow his reason with emotion. He must also be prepared to deal with cure's impossibility, treatment's failure and death's inevitability. All this requires low levels in the personality's domain Neuroticism. Men and women emotionally anxious, depressed, vulnerable, concerned, with difficulty to control their impulses, and inadequate coping responses have high scores on the facets of Neuroticism, according to Costa and McCrae¹². The students of FMUC had decreased their levels in three of the six Neuroticism's facets – Anxiety (N1), Depression (N3) and Vulnerability (N6), during their career at medical school.

This leads us to the conclusion that we are in presence of future doctors who are emotionally stable. This decrease is a very positive effect of the academic course and context in these students' personality, minding the fact they are going to start their clinical activity soon. "Physicians must be compassionate and empathetic in caring for patients, and must be trustworthy and truthful in all of their professional dealings", as it is written in the Learning Objectives for Medical Student Education ³. The doctor must be friendly, helpful, straight and honest, and must be willing to believe in patients, in order to establish a good relationship amongst them. To keep a healthy relationship the physician has also to respect dignity of patients as persons and act with integrity, never putting their privacy at risk, and always caring for them, "even when they're dying and therapy is no longer available or desired" ³. The doctor must be modest, gentle, and shall not be judgmental. He must know the environment in which is inserted his patients' community, in order to "understand the meaning of the patients' stories in the context of the patient's beliefs and their family and cultural values" ³. These are some of the characteristics of people with high levels in Agreeableness ¹³.

The students who answered the NEO-PI-R twice decreased their levels of Altruism (A3) and Modesty (A5), two of the Agreeableness' facets. The individual with high levels of Modesty is humble and little worried about himself ¹³. Altruism reveals an active concern for others – a subject with a high level of altruism is generous, philanthropist, courteous, socially concerned and willing to help. The decrease of these two facets' levels at students of FMUC concerns us. This indicates that throughout the course, as their Altruism level decreases, these medical students may start being more focused on themselves and may become reluctant to get involved with others' problems. At the same time, while their Modesty level also decreases, they may start to develop an arrogant and overrated vision of themselves in relation to others. In medical school, students' socialization and adaptation to their future professional role is

marked by the increase of cynicism and weaken of idealism, as recognized by Becker et al ¹⁸. These occurrences can explain the decrease in Altruism and Modesty revealed in this study and the decline of empathy referred at the beginning of this paper. The self-focusing attitude, arrogance and lack of involvement with others are opposite to the commitment, understanding and compassionate treatment of patients expected in future physicians' behavior.

In 1981, Digman and Takemoto-Chock ¹⁹ showed the positive influence of conscientiousness, organization and persistence in academic performance. The future physician must be a professional with skills for continuous learning throughout life in order to respond to a journey of great personal and institutional requirements ²⁰. This ability must be already present or, if not, cultivated during his academic course. It requires competence and motivation skills, which are essential conditions for the execution of a behavior-oriented goal. These mentioned capabilities are strongly present in an individual with high levels of Conscientiousness. Individuals with low levels in this personality's domain are less stubborn in the pursuit of their objectives ¹³. They are also lazier, careless, and negligent, having weak willpower.

The 70 students of FMUC increased their Self-Discipline, the fifth Conscientiousness's facet, during their academic course. Self-disciplined subjects are dutiful, methodic, prepared. They have the ability to motivate themselves in order to start a task and take it to the end, despite any kind of distraction ¹².

This increase might be understood by the perspective of the self-efficacy construct. The conceptualization, operationalization and first research of this construct are due to Bandura. Self-efficacy is defined by Bandura as "the judgment of the self-capabilities to execute courses of action required to achieve some degree of performance" ²¹. This refers more specifically to the fact that it's not only necessary one to possess intelligence, knowledge and abilities, but also to believe one has them and knows how to use them in order to achieve the

objectives it sets itself. In the academic context, this concept is present when a student selects activities and strategies he believes he can perform, and leaves other goals or courses of action that doesn't represent an incentive or doesn't allow him to acquire new knowledge or skills. There is evidence of relation between self-efficacy beliefs and self-regulated learning. Several studies ²²⁻²⁴ demonstrated that self-regulated students are active learners who manage effectively, flexibly and independently their own process of learning and their motivation. Also, Pintrich and De Groot ²⁵ found that self-efficacy beliefs are directly related to school performance. Self-regulated students appropriate choices of courses of action towards academic demands.

How this study's students managed to get in a Medical School may have acted as positive reinforcement of their sense of self-efficacy, which motivated an increase in their self-discipline values. The increase of this level is considered as a good outcome, minding the responsibilities these future physicians will bare in their medical career – to continuously update the knowledge they received during Medical School, in order to provide always the best treatment to their patients.

The results of our study shall be interpreted with caution. There was a loss of just over half the Moment 1 sample, so we cannot say for sure that Moment 2 sample is representative of Moment 1. The students who answered twice may demonstrate to be more open to experience, or less neurotic, once they accepted freely and naturally to answer the questionnaire again. Also, this study would be more accurate if students were evaluated not only in the S form of the NEO-PI-R questionnaire – the self-evaluation form used in this study –, but also in the R form – a form with 240 items as well, but designed for the evaluation by an observer, as a colleague, a spouse or a specialist. This R form would determine independent estimates on the five domains and would also validate or supplement the self-assessments we obtained.

In conclusion, we believe this study evidences predominantly positive changes in these students' personality throughout their academic career. Despite the decrease in Modesty and Altruism, there are ways to help improving these interpersonal skills, for instance, by outside observation and analysis of encounters with patients, role-playing, experience of hospitalization, participation in small-group discussion, as explained by Hojat ²⁶. We can only motivate those in charge to change the current medical curriculum in order to include these kinds of activities at the wise time of the evolution of these students' medical role. For future research we would like to suggest a look into different pathways with different moderators (e.g. gender; intellectual, interpersonal and personal skills; ...) and mediators (e.g. improving in interpersonal skills through curricular interventions) variables.

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Appendix I

NEO-PI-R

Revised NEO Personality Inventory administered in this study

Appendix II

Academic Medicine – Journal of the Association of American Medical Colleges

**Editorial Policy, Publication Ethics, and Complete Instructions
for Authors followed by this scientific paper**

Editorial Policy and Publication Ethics

Editorial Focus

Academic Medicine, the Association of American Medical Colleges' (AAMC's) peer-reviewed monthly journal, serves as an international forum for the exchange of ideas, information, and strategies that address the major challenges facing the academic medicine community as it strives to carry out its missions in the public interest.

To be considered for publication in *Academic Medicine*, all submissions to the journal must address one or more of the key aspects of a major challenge facing academic medicine today. Submissions may address theoretical and/or practical facets of education and training issues; health and science policy; institutional policy, management, and values; research practice; clinical practice in academic settings; and other topics relevant to medical schools and teaching hospitals. Submissions may describe a practical approach to dealing with the issue addressed, add to readers' understanding of that issue, or both. Priority will be given to works that are likely to change thinking and/or practice.

Ethical Considerations

Authorship

Academic Medicine follows the Uniform Guidelines for Biomedical Journals Requirements of the ICMJE for determining authorship (Vancouver Group Guidelines, 2001).

- Authorship is based on (1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, and (3) final approval of the version to be published. Authors must meet conditions 1, 2, and 3.
- When a large, multi-center group has conducted the work, the group should identify the individuals who accept direct responsibility for the manuscript. These individuals should fully meet the criteria for authorship/contributorship defined above. When submitting a group author manuscript, the corresponding author should clearly indicate the preferred citation and should clearly identify all individual authors as well as the group name.
- Acquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship.
- All persons designated as authors should qualify for authorship, and all those who qualify should be listed.
- Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content.
- All contributors who do not meet these criteria for authorship should be listed in the acknowledgments section. Examples of those who might be acknowledged include a person who provided purely technical help or writing assistance, or a department chair who provided only general support.

Terms of Consideration

Manuscripts are considered for publication with the understanding that they are not under consideration by other journals and have not been published in the same or substantially similar form previously.

Prior and Duplicate Publication

At submission, authors must explain any prior publication of the same or a substantially similar manuscript, or partial disclosure of data, as well as circumstances that might lead the editor-in-chief, reviewers, or editorial staff to believe (1) that the manuscript may have been published elsewhere (for example, when the title of a submitted manuscript is the same as or similar to the title of a previously published article), or (2) that the manuscript or one very similar to it may have been published in or submitted to *Academic Medicine* previously.

These circumstances include but are not limited to (1) cases where the results of the same study are divided into different manuscripts (e.g., findings for faculty are reported in one and findings for residents are reported in another), one of which is submitted to *Academic Medicine* and another of which is submitted either to *Academic Medicine* or elsewhere, and/or (2) cases in which data from the same study are analyzed in different ways to produce apparently different manuscripts.

Short abstracts (250-300 words) of preliminary research findings presented in conference proceedings are not considered prior publications.

Simultaneous Submission

Authors may not send the same manuscript to more than one journal at the same time, or to any other publisher of books, electronic materials, or other materials. If the editor-in-chief or editorial staff learns of possible simultaneous submission, *Academic Medicine* reserves the right to consult with other journal editor(s) who have received the manuscript. Furthermore, the manuscript may be rejected without review, or may be rejected without regard to the reviews. The editor-in-chief may make a decision about acceptance in discussion with the other journal editor(s) involved.

Conflict of Interest

Authorial

Authors are required to declare any and all conflicts of interest—financial, personal, or other—that may affect the information, research, analysis, or interpretation presented in the manuscript in the structured disclosure section that appears after the text, before the references in every article and report published in *Academic Medicine*. A conflict of interest exists when professional judgment concerning a primary interest may be influenced by secondary interests. This information will be held in confidence by the editor-in-chief, unless the manuscript is accepted; in which case a general description of the conflict will be published with the article.

Editorial

Reviewers and editors are required to declare any and all potential conflicts of interest. If an author of a manuscript under consideration has a primary appointment at the editor-in-chief's institution, decisions regarding that manuscript will be made by an advisor who is independent of the editor-in-chief.

Editorial Board

An editorial board is appointed by the editor-in-chief to provide guidance and advice to the editor-in-chief regarding journal content and editorial focus. Members of the *Academic Medicine* Editorial Board are expected to (1) present unbiased, independent, and professional advice to the editor-in-chief, (2) maintain confidentiality about editorial board activities and

discussion, and (3) sign a disclosure form to affirm that he or she has read, understands, and agrees to abide by the conflict of interest policy and to disclose any known conflicts or to state that no conflicts exist at the time. Conflicts of interest must be disclosed to the editor-in-chief who will determine how to manage, reduce, or eliminate the conflict.

Compliance with NIH and Other Research Funding Agency Accessibility Requirements

A number of research funding agencies now require or request authors to submit the post-print (the article after peer review and acceptance but not the final published article) to a repository that is accessible online by all without charge. As a service to our authors, LWW (*Academic Medicine's* publisher) will identify to the National Library of Medicine (NLM) articles that require deposit and will transmit the post-print of an article based on research funded in whole or in part by the National Institutes of Health, Wellcome Trust, Howard Hughes Medical Institute, or other funding agencies to PubMed Central. The revised Author Agreement provides the mechanism.

Copyright and Permission

The content of the published manuscript, as read and approved by the authors after editing and as proofread by the authors after it is typeset, is the responsibility of the authors.

The authors assign copyright to the Association of American Medical Colleges (AAMC), which publishes *Academic Medicine*. Material published in *Academic Medicine*, in print and online, is covered by copyright. Written permission must be received to reproduce, display, or transmit journal content in any form by any means.

Authors are wholly responsible for identifying materials in their manuscripts that are copyrighted by other publishers or authors, and authors must obtain written permission to use these materials in the submitted manuscript.

Ethical Approval for Studies Involving Human Participants

Academic Medicine's policies regarding the treatment of human participants follow those of the International Committee of Medical Journal Editors (ICMJE). For studies or evaluations involving human participants (including students, residents, and faculty), it is the author's responsibility to provide details of ethical approval for the research in the manuscript (preferably in the "Methods" section), including but not limited to the name of the approving committee (e.g., Institutional Review Board, Research Ethics Board) and the name of the institution at which approval was granted. (Please note that at many U.S. institutions, a decision of "exempt" must be made by an Institutional Review Board or an individual designated by the institution, but may not be made by the investigator.)

Authors who do not have access to a formal ethical approval process must provide information in the manuscript about the treatment of human participants. The following should be addressed:

- how risks to human participants were minimized,
- why the risks were reasonable in relation to anticipated benefits,
- how the selection of participants was equitable,
- whether adequate procedures were in place to ensure the privacy and confidentiality of participants,
- the plan used to monitor the data and safety of the subjects,
- how informed consent was sought and documented,

- if applicable, what safeguards were used to protect vulnerable populations, and
- other relevant information.

It is the responsibility of the author(s) to ensure that studies have been conducted in accordance with the latest version of the principles of the Declaration of Helsinki. Also, it may be useful to consult the statements on ethics of the American Educational Research Association, the American Psychological Association, the American Sociological Association, and/or other national and international organizations.

Embargo

The embargo period begins when a manuscript is submitted to *Academic Medicine* and ends on the publication date at 6:00 p.m. eastern time. The embargo means that information concerning the manuscript cannot be published, broadcast, posted online, or otherwise placed in the public domain until the manuscript is published.

Communication with the Media

Academic Medicine sends out advance notice of upcoming articles to members of the press. Authors may therefore receive calls or emails from representatives of the media during this time. We encourage authors to cooperate with journalists to maximize the accuracy of subsequent media coverage. Authors whose articles are scheduled for publication may also arrange their own publicity, but they must strictly adhere to *Academic Medicine's* press embargo. If an author's organization is planning a press release, media pitch, or other media outreach, these activities should be coordinated with Lesley Ward, AAMC Senior Media Relations Specialist, at lward@aamc.org.

Communications with Colleagues or at Conferences

Academic Medicine recognizes the importance of timely communication among researchers. For that reason, presentation and discussion at conferences and meetings of manuscripts that have been submitted to *Academic Medicine* is permitted, but authors must indicate that their work is subject to the press embargo above. Authors may publish abstracts in conference proceedings, but should not distribute copies of manuscripts, or tables and figures from manuscripts, that are under embargo.

Types of Manuscripts

Articles, Perspectives, Commentaries, Point–Counterpoints

Articles may vary in style and length. Generally, they are no longer than 3,000 words and no shorter than 1,500 words. However, an author should choose the manuscript length and number of references needed to get the message across. The final length and format will be determined by editorial staff during the review process or when the accepted manuscript is edited.

Articles may have up to five tables or figures in total. The abstract for an article has no headings and is no longer than 250 words. The number of references should be appropriate to the length and depth of the piece. References should be representative, not comprehensive, and are generally limited to 50.

Articles are generally of 4 types:

1. *General scholarly articles*

- The article covers topics of broad concern to academic medicine; for example, examinations of policies affecting the academic medicine community as a whole; descriptions of institutional mergers or starting new schools, analyses of current educational, political, financial, or social trends affecting or likely to affect academic medicine; and descriptions of innovations with systemic implications for medical education, training, and research.
- The article describes topics directly and practically relevant to medical school education, residency training, graduate medical education, or continuing medical education. Such topics include descriptions of innovative programs, medical informatics, information and medical technologies, the history of medical education and training, humanities in medical education, administration or funding innovations, etc.
- The article combines elements of research and description, where the research is not sufficiently robust or central enough to the article's message to constitute a full-fledged research report.

2. *Perspectives* describe a considered view about one or more issues in academic medicine, propose and support a new hypothesis, or theorize the implications of as-yet unimplemented programs or innovations. Perspectives, which are peer reviewed, must be scholarly and arguments must be well-supported. They generally have few tables and figures, if any.

3. *Commentaries* are solicited opinion essays that comment on or set the context for an article or articles that have been accepted for publication. They can also be stand-alone essays framed as calls to action on major challenges. Commentaries have few references and rely heavily on the author's perspective and experience to support the argument. They should be less than 2,000 words and generally have few tables and figures, if any.

4. *Point-Counterpoints* are page-long, invited articles (750 words). Like commentaries, they may respond to an accepted article, or may explore two or more sides of an issue. They generally have few tables and figures, if any.

Additional guidelines for articles can be found in the Publication Criteria for Articles.

Research Reports

Research reports are reports of original research on any aspect of academic medicine. They may vary in style and length. Generally, research reports are no longer than 3,000 words and no shorter than 1,500 words. However, an author should choose the manuscript length and number of references needed to get the message across. The final length and format will be determined by editorial staff during the review process or when the accepted manuscript is edited.

Research reports may have up to five tables or figures in total. The abstract for a research report should be structured under the headings Purpose, Method, Results, Conclusions, and no longer than 250 words. The number of references should be appropriate to the length and depth of the piece; except for literature reviews references should be representative, not comprehensive, and are generally limited to 50.

The following are general research parameters:

- The study addresses a serious challenge facing the academic medicine community.
- The study critically reviews the scholarly literature. While a systematic or chronological review may be considered, priority will be given to critical reviews that help advance our understanding of a specific topic or problem. Comprehensive parameters are defined and followed for searching the literature, and findings are interpreted and put into context.

Special Features

Abstracts are not needed for the items in the following categories; generally, references are not needed either.

Cover Art

These original works of art should be inspired by, but not necessarily representative of, a health care experience from any perspective: caregiver, student, or patient (for example, learning how to be a physician or scientist, caring for patients, exploring research questions, making a new discovery, being a research participant, teaching, or being cared for in a teaching hospital). The journal welcomes photography, sculpture, painting, textile work, and other visual media. Images may be cropped or resized to fit into the allotted cover space. Acceptance is contingent on the artist's signing an AAMC Artist Consent Form.

Artists must also submit a related Cover Art essay as a narrative companion to the artwork, to explain the connection between the work and the "academic medicine experience." The related narrative should be 250 to 600 words and is subject to editing.

High-resolution TIFF files with a minimum of 300 dpi resolution are required at the time of submission. Images are at least 4 ¼" x 4 ¼" (with the ideal size being 4 ¼" x 4 ½") and are vertical or square, not horizontal. Images must be grayscale or CMYK. Submissions do not require an abstract.

Last Page ("LP")

This monthly feature is designed to make the journal's content more accessible to more people by promoting a general understanding of important issues that affect medical schools and teaching hospitals. This feature tells a story, visually and succinctly, through images, data, or other graphics of phenomena, controversies, policies, groups, services, or trends important to medical education or the medical community at large. Each LP and all the information on a single LP should answer a single question or satisfy a single objective. LP topics should be timely (i.e., relate to items of current or on-going interest in the medical education community) and evidence-based.

An LP may have as many images or statistics as can fit well on one portrait-oriented page. Submissions do not require an abstract. Not all of the information needs to be new, but it must be combined and presented in a unique way so as to provide new insights to AM readers.

All aspects of an LP submission—information, data, images, graphics, and other materials—must be submitted electronically in three to six MS PowerPoint slides. Photos and graphics must be of print quality. Submissions are subject to editing and peer review.

Letters to the Editor

Letters can be responses to articles in the journal, replies to other letters, or about issues of importance in academic medicine. They must not duplicate other material that has been published or submitted for publication. Letters will be published at the discretion of the editor and are subject to abridgement and editing for style and content.

Letters should be tightly focused and are no longer than 400 words (including references). They have no tables or figures and no more than three authors. Submissions do not require an abstract. The cover letter that accompanies submissions must include the full citation of the article or letter being commented upon.

Authors whose published articles are the subject of a Letter to the Editor will have the opportunity to respond to that letter, in the same issue in which the letter is printed.

Medicine and the Arts (MATA)

The journal's longest-running feature, this column runs on two facing pages; the left-hand page features an excerpt from literature, a poem, a photograph, etc. Literature excerpts generally run no more than 700 words and may include a very brief introduction as needed. On the right-hand page is a commentary of about 900 words that explores the relevance of the artwork to the teaching and/or practice of medicine. Since submissions cannot be fully accepted for publication until *Academic Medicine* acquires permission to reprint literary excerpts or artworks, authors should include all relevant information about the piece they are explicating (publisher, museum, dates, etc.) to enable staff editors to find and contact the copyright holder.

Teaching and Learning Moments (TLM)

This feature is published on a regular but space-available basis. Pieces vary in style and subject, but most are first-person, informal narratives written from the perspective of instructor, student, or patient. Typically, the author relates an experience or idea that provides a lesson applicable to the art or science of teaching, learning, or practicing medicine. Essays range from 250-600 words and must fit on one journal page.

Complete Instructions for Authors

Preparing a Manuscript: Requirements and Standards

General Format

- All manuscripts must be submitted electronically via Editorial Manager at <http://www.editorialmanager.com/acadmed/>.
- Manuscripts should be double spaced and left-justified, including references. Use 12-point type, approximately 1-inch margins, and format for 8 ½ x 11 paper
- Supply a title page as the first page of the manuscript with the following information:
 1. The manuscript's full title
 2. An author byline that lists all authors' full names and academic degrees above a Masters; *for example*, "Jane M. Smith, MD, PhD, and John Q. James, MD"

3. Sentence-style bios for each author than list position(s) or title(s) and institutional affiliation(s); *for example*, "Dr. Smith is assistant professor, Department of Family Medicine, State University College of Medicine"
4. Contact information (address and email address, plus telephone and/or fax) for the corresponding author
5. Disclosure of funding received for this work from any of the following organizations: National Institutes of Health (NIH); Wellcome Trust; Howard Hughes Medical Institute (HHMI); and other(s).

- Spell out all acronyms in full at first use.
- Generally, write using the first person, active voice; for example, "We analyzed data," not "Data were analyzed." The Abstract and acknowledgments/disclaimers are the exceptions to this guideline, and should be written in the third person, active voice; "The authors analyzed," "The authors wish to thank."

File Formats

NOTE: The types of files accepted when manuscripts are originally submitted for review and consideration through Editorial Manager are not the same types of files supplied if a manuscript is accepted and will be edited.

For reviewing purposes (initial decisions about a manuscript), Editorial Manager accepts the following files:

Text Files:

- MS Word
- RTF
- PostScript
- PDF

Graphics Files:

- MS Word
- TIFF
- EPS
- PostScript
- PDF
- PowerPoint

For editing purposes (once a manuscript is accepted), edit-ready files must be submitted through Editorial Manager. PDFs or JPEGs are not acceptable for text or graphics. At this stage, Editorial Manager accepts the following:

- MS Word
- RTF
- PostScript
- PowerPoint
- Excel

Editorial staff require files that can be opened and manipulated in Word, PowerPoint, Excel, or Illustrator. Please see sections on tables and figures for information about formatting graphics.

Detailed Instructions

NOTE: The editor-in-chief or editorial staff will make reasonable allowance for minor deviations from these specifications as long as they do not interfere with reading, reviewing,

or editing the manuscript. Corrections or changes may be required of authors if the manuscript undergoes revisions. Major deviations, however, will lead journal staff to require corrections before the manuscript is initially processed.

Abstract

- The abstract should be written in the past tense, third person, and must not exceed 250 words. For example, "The authors interviewed 30 deans?."
- The abstract must fully reflect the scope of the manuscript.
- For research reports only, abstracts must be in the structured form of four paragraphs, with headings Purpose, Method, Results, and Conclusions; and must include the year of the study.

Headings

- **For all manuscripts.** Use main headings and short subheadings as needed. Do not create a heading at the very top of the manuscript (e.g., "Introduction"), since layout constraints make such headings unworkable. Distinguish main-level headings (16-point font, bold) from subheadings (12-point font, bold). If subheadings are used, two or more such headings must be used, as in outline style.
- **For research reports.** Structure the body of the manuscript using the headings Introduction, Method, Results, and Conclusions. At least a full paragraph of text must precede the Introduction heading, for layout reasons.
- **For articles.** Create headings that are substantive and interesting and that will give readers a sense of the article's organization. Make headings as short as is feasible. At least a full paragraph of text must precede the initial heading, for layout reasons.

Tables

- Use tables (1) only when their information cannot easily be stated or summarized in the manuscript, and (2) only when that information concerns a central issue of the manuscript.
- Up to 5 tables and figures, total, are permitted
- Tables must be created in Word using the table function. Tables informally created in Word with tabbing or spacing will not be accepted.
- Table titles should make the table sufficiently understandable independent of the manuscript. Typically, include type of data, number and type of respondents, place of study, year of study. Titles should be placed directly above the table, not in a data cell.
- Columns should be clearly labeled, including unit of measure.
- Footnotes: If information is needed to make the table understandable that won't easily fit into the table title or data cells, create one or more footnotes. Place footnotes at the bottom of the table, not in a data cell.
- Symbols are * † ‡ § ¶
- All tables should be separated from the text file, yet bundled into a common file, with individual tables separated by page breaks.
- All tables should be called out in the text.

Figures

- Use figures (1) only when their information cannot easily be stated or summarized in the manuscript, and (2) only when that information concerns a central issue of the manuscript.
- Up to 5 tables and figures, total, are permitted.
- Figures are acceptable as Excel, PowerPoint, Word, or PostScript files. All files supplied must be "live" figures that can be opened and formatted. PDFs and JPGs are not accepted.
- Figures should be two-dimensional; black-and-white or grayscale; and without gridlines or background shading. X and Y axes, if present, must be labeled.
- Figure legends should make the figure sufficiently understandable independent of the manuscript. Legends should be placed on the last page in the manuscript.
- All figures should be separated from the text file, yet bundled into a common file, if possible, with individual figures separated by page breaks.
- All figures should be called out in the text.

References

- Authors are responsible for the accuracy and completeness of their references and for correct text citations.
- *Academic Medicine's* reference style for the format and sequence of citations mirrors American Medical Association (AMA) style. (See *American Medical Association Manual of Style: A Guide for Authors and Editors*, 10th edition, chapter 3. Oxford: Oxford University Press, 2007.)
- The list of references should be double spaced and placed at the end of the manuscript.
- Number the reference citations according to the order in which they are referred to in the manuscript (do not list alphabetically). Use superscripts in the body of the text to indicate the reference list numbers being cited. Do not use footnotes.
- Any unpublished sources and personal communications should be listed as references rather than noted within the text of the manuscript in parentheses.
- For guidance, see Examples of Typical References. For more comprehensive examples, please consult the AMA style guide, 10th edition.

Acknowledgments, Funding, Disclaimers, Permissions, Ethical Approval

- Acknowledgments, Support/Funding, Other Disclosures, Ethical Approval, Disclaimer: All articles published in *Academic Medicine* must include a structured disclosures section at the end of the text, before the reference list, using the category headings specified below. Each category should appear as a separate paragraph in the following order:
 1. *Acknowledgments*: Write author acknowledgments in the third person ("The authors wish to thank..."), or indicate "None."
 2. *Funding/Support*: List any external funding, including grant names or numbers, or indicate "None."
 3. *Other disclosures*: List any potential conflicts of interests for author(s) of this manuscript that fit *Academic Medicine's* Authorial Conflict of Interest Policy, or indicate "None."

4. *Ethical approval*: For manuscripts involving studies or evaluations of human participants, either state that ethical approval has been granted (or waived) for studies involving human subjects, or indicate "Not applicable." For more information, review Ethical Approval for Studies Involving Human Participants.
5. *Disclaimer*: Write any disclaimer in the third person, or indicate "None."
6. *Previous presentations*: Report previous presentation of materials in a different form, such as at a conference, or indicate "None."

Supplemental Digital Content (SDC): Authors may submit SDC via Editorial Manager to LWW journals that enhance their article's text to be considered for online posting. SDC may include standard media such as text documents, graphs, audio, video, etc. On the Attach Files page of the submission process, please select Supplemental Audio, Video, or Data for your uploaded file as the Submission Item. If an article with SDC is accepted, our production staff will create a URL with the SDC file. The URL will be placed in the call-out within the article. SDC files are not copy-edited by LWW staff, they will be presented digitally as submitted. For a list of all available file types and detailed instructions, please visit <http://links.lww.com/A142>.

SDC Call-outs

Supplemental Digital Content must be cited consecutively in the text of the submitted manuscript. Citations should include the type of material submitted (Audio, Figure, Table, etc.), be clearly labeled as "Supplemental Digital Content," include the sequential list number, and provide a description of the supplemental content. All descriptive text should be included in the call-out as it will not appear elsewhere in the article.

Example:

We performed many tests on the degrees of flexibility in the elbow (see Video, Supplemental Digital Content 1, which demonstrates elbow flexibility) and found our results inconclusive.

List of Supplemental Digital Content

A listing of Supplemental Digital Content must be submitted at the end of the manuscript file. Include the SDC number and file type of the Supplemental Digital Content. This text will be removed by our production staff and not be published.

Example:

Supplemental Digital Content 1. wmv

SDC File Requirements

All acceptable file types are permissible up to 10 MBs. For audio or video files greater than 10 MBs, authors should first query the journal office for approval.

"Uniform Requirements" and Academic Medicine Format

Academic Medicine will consider manuscripts prepared according to:

1. *Academic Medicine's* specific requirements as outlined in these instructions, or
2. The "Uniform Requirements for Articles Submitted to Biomedical Journals". The Uniform Requirements is a set of consensus guidelines agreed to by approximately 500 English-language biomedical journals. Participating journals will consider all manuscripts that conform to the Uniform Requirements even though each journal has different specific requirements for format—in other words, the journal will not refuse to consider a manuscript merely because it does not conform to that journal's

specific requirements (e.g., for references, table format, or organization) if the manuscript is prepared according to the Uniform Requirements.

If *Academic Medicine* accepts a manuscript prepared according to the Uniform Requirements, **the author must then revise the manuscript to meet *Academic Medicine's* specific requirements (reference style, for example) as directed by a staff editor.**

Submitting a Manuscript

Online submission

- Manuscripts must be electronically submitted via Editorial Manager, the journal's online submission system. After creating an author's account, follow the step-by-step instructions.
- The user name and password with which you access full-text articles on the journal's Web site are independent of your Editorial Manager account user name and password.
- First-time users: Please click the Register button on the Editorial Manager log-in page and enter the requested information. On successful registration, you will be sent an e-mail indicating your user name and password. Print a copy of this information for future reference.
- Authors: Please click the log-in button from the menu at the top of the page and log in to the system as an Author. Submit your manuscript according to the instructions given by Editorial Manager. You will be able to track the progress of your manuscript through the system.
- Returning authors: do not create a new account when submitting a new manuscript. If you cannot recall your existing password, follow the prompts on the log-in screen. If you cannot recall your existing user name, contact the journal offices at 202-828-0590 or email, acadmed_online@aamc.org.
- Refer to Preparing a Manuscript: Requirements and Standards for manuscript formatting instructions.
- For questions related to online submissions, or if you encounter difficulty uploading your manuscript, please contact the journal offices at 202-828-0590 or email, acadmed_online@aamc.org.

Submission Requirements

Editorial Manager requires the following information at the time of submission. Manuscripts will not be considered unless they include the following components.

- Name of the corresponding author, his or her full mailing address and telephone number, and fax and e-mail information if available.
- Name of a backup person (e.g., co-author, assistant), with phone and e-mail information, whom journal staff can contact if the corresponding author cannot be reached.
- The working title of the manuscript.
- A statement that the manuscript has not been previously published and is not under consideration in the same or substantially similar form in any other journal.
- A statement that all those listed as authors are qualified for authorship and that all who are qualified to be authors are listed as authors on the byline.

- A statement that, to the author's knowledge, no conflict of interest, financial or other, exists. (If a possible conflict exists, the author must describe the circumstances.)
- Acknowledgment of funding, in whole or in part, specifically by the National Institutes of Health, Wellcome Trust, Howard Hughes Medical Institute, or other funding agencies.
- For any manuscript that includes one or more studies involving human participants, it is the author's responsibility to indicate ethical approval by the appropriate committee (e.g., Institutional Review Board, Research Ethics Board) to conduct such research.

How Manuscripts Are Processed

1. **Initial Processing.** All manuscripts are automatically logged into our tracking system when they are submitted online through Editorial Manager and processed for conformity to basic standards. Authors are able to track the decision process via Editorial Manager.
2. **Initial Review.** All manuscripts undergo internal review by the editor-in-chief, and the staff editors as appropriate.
3. **Peer Review.** Some manuscripts are selected after this initial review to be sent to external peer review. Reviewers are required (1) to keep the manuscript confidential; (2) not to make copies of the manuscript or share its content with others without the permission of the editor-in-chief; and (3) to apprise the editor-in-chief of any conflicts or biases that might affect their ability to objectively assess the manuscript. The review process for all manuscripts is "partially masked"—that is, a reviewer's identity is not revealed to the author or to other reviewers of the same manuscript. However, each peer reviewer will receive a copy of the decision letter for the manuscript that she or he has reviewed.
4. **Publication Decisions.** Most decisions are made within 90 days of receipt of the manuscript. Authors are notified of decisions via email. See Editorial Conflict of Interest for additional information about decision making.
5. **Revisions.** Most manuscripts require revisions, minor or extensive, before they are accepted in full for publication. Authors receive instructions for revisions in manuscript decision letters, based on peer review feedback and staff editors' feedback.
6. **Editing.** All accepted manuscripts are substantively edited for content and overall presentation, not merely for grammar and correct style, so authors should be prepared for further revisions (sometimes extensive) during editing. These revisions reflect the editor-in-chief's and the staff editors' detailed critiques of presentation, completeness, clarity, and balance. Some changes are needed to make content clearer to a broad readership; others are required so that the manuscript will conform to "house style" (that is, to be consistent with rules for standardized terminology, reference style, table style, spelling, and word usage).
The authors are responsible for the accuracy of the final, edited version, which the corresponding author approves on behalf of all authors, either after consulting with all co-authors or by obtaining their advance authority to approve the final version on their behalf. Once the final, approved version is typeset, the authors may not rewrite or revise content (except to correct errors in data or typesetting); therefore, it is essential that the corresponding author

ensure the accuracy of the final, edited version before it is sent to the publishing house for final checking and typesetting.

7. **Proofs.** Technical production is handled by the journal's publisher, Lippincott, Williams, and Wilkins (LWW). LWW's production editor will send a PDF file proof and instructions via e-mail to the corresponding author, who returns the corrected proof and the authors' orders for reprints to her directly. LWW also coordinates publication of the online version of the journal. The corresponding author is responsible for proofreading the typeset materials, and consequently all authors are wholly responsible for the accuracy of the final printed version based on that proof. The corresponding author may correct typographical errors and data errors but may not make discretionary or non-error changes to the proof. If the authors make discretionary changes that should have been made during editing, they may be charged the cost of these extra changes.
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9. **Rejected manuscripts.** When a submitted manuscript is not accepted for publication, the editorial office will retain an electronic copy of it. The editor-in-chief reserves the right, however, to discuss the manuscript and its disposition with the editor of another journal if the editor has a reasonable concern that duplicate publication, simultaneous submission, or other inappropriate actions have been taken.

Troubleshooting

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